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1. Maize stalk-borer resistance.

The first-generation larvae of maize stalk-borer (Calamistis fusca, Hmps.) generally emerge prior to tasseling and feed in the whorl of leaves prior to burrowing through the stalk to the base of the plant where they pupate. In this respect, the insect is similar to European corn borer. The second and succeeding generations generally feed in the ears causing a type of damage similar to corn earworm. Prior to complete maturity the borers migrate to the base of the plant for overwintering. The average annual loss due to the ravages of this insect has been assessed at about 10 percent. Little apparent success has accrued from selection for resistance.

Data collected on infestation and degree of damage of ears in single cross yield trials and inbred tests during 1953-54 was used as a basis for classifying resistant and susceptible inbreds. In addition to obtaining the percentage of ears infested, the infested ears were scored as to the average percent of grain destroyed per ear. The product of these figures provided the actual grain loss per sample. The inbreds and crosses between them were compared under heavy natural infestations.

The resistant lines selected for testing during 1954-55 were all flint types, while the susceptible lines were soft dents; e.g., Hy and 38-11. The infestation in the plants as well as in the ears was obtained in these tests. A highly significant r of + .71 ($N = 24$) between plant and ear infestation indicated that resistance was not due entirely to the type of grain.

The lines selected for testing during the 1955-56 season consisted entirely of similar dent types, and here also a highly significant r of + .72 ($N = 21$) between ear and plant infestation suggested that plant resistance is closely associated with ear resistance. The slight dominance of resistance to ear damage in 1954-55 was not apparent in the dent types tested during 1955-56 indicating that resistance to ear damage is due in part to the hard flint grain type.

The data given in the following table shows that the percentage infestation in both plants and ears and the degree of ear damage to maize stalk borer is controlled genetically and that classification of ears for infestation and degree of damage is a reliable guide to plant resistance. Studies on inheritance of resistance to this insect are now under way.

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S in
R X
R X
S X

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	1954-55			1955-56	
	Plant infesta- tion, 74 days	Ear infesta- tion	Total damage in ear	Plant infesta- tion, 126 days	Ear infesta- tion
	%	%	%	%	%
R inbreds	47.3	17.4	0.46	-	-
S inbreds	70.1	38.9	1.20	-	-
R X R	53.5	26.8	0.85	32.4	13.4
R X S	60.7	28.9	1.01	39.4	20.9
S X S	78.1	61.7	3.44	50.8	30.1

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1. Breeding tests for blight resistance.

Inbred lines resistant to the leaf blight caused by Helminthosporium turcicum differ greatly in their usefulness as sources of blight resistance. Experiments to evaluate the comparative breeding potential of resistant inbred lines have been in progress for several years. The general procedure has been to cross the resistant lines with one or more susceptible testers, advance the crosses to the F₂ generation, grow these populations under a heavy blight epidemic, make individual blight ratings on the F₂ plants, and compare the distributions of these F₂ blight scores.

An experiment involving 16 resistant inbred lines and the three susceptible testers R4, Tr and 187-2 was grown at Belle Glade, Florida last spring. The resistant lines, the mean blight scores of the F₁ and F₂ plants of the crosses involving them and the percentage of F₂ plants with "0" blight ratings are listed in table 1. The tests suggest that CI.90A and GAL440 are superior to the other tested lines as breeding sources of resistance.